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Retentate from Reverse Osmosis Stimulates Degradation Potential of Bioaugmentation Candidate *Aminobacter* sp. MSH1

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BACKGROUND & SUMMARY

- Groundwater is an important resource in drinking water production, but is threatened by recalcitrant pollutants, such as the pesticide residue 2,6-dichlorobenzamide (BAM)¹.
- We aim to combine retentate from membrane separation and bioaugmentation as a novel biotechnology for removal of micropollutants (BOX 1).
- Here we show results (BOX 3) from batch experiment(s), using a BAM-degrading bacteria, *Aminobacter* sp. MSH1, in untreated and retentate water (BOX 2).

SCIENTIFIC QUESTIONS

- How is BAM degradation potential of *Aminobacter* sp. MSH1 affected in different membrane retentates versus untreated water?
- Is there an optimal retentate with respect to BAM degradation?
- Is MSH1 population negatively affected in the retentates?

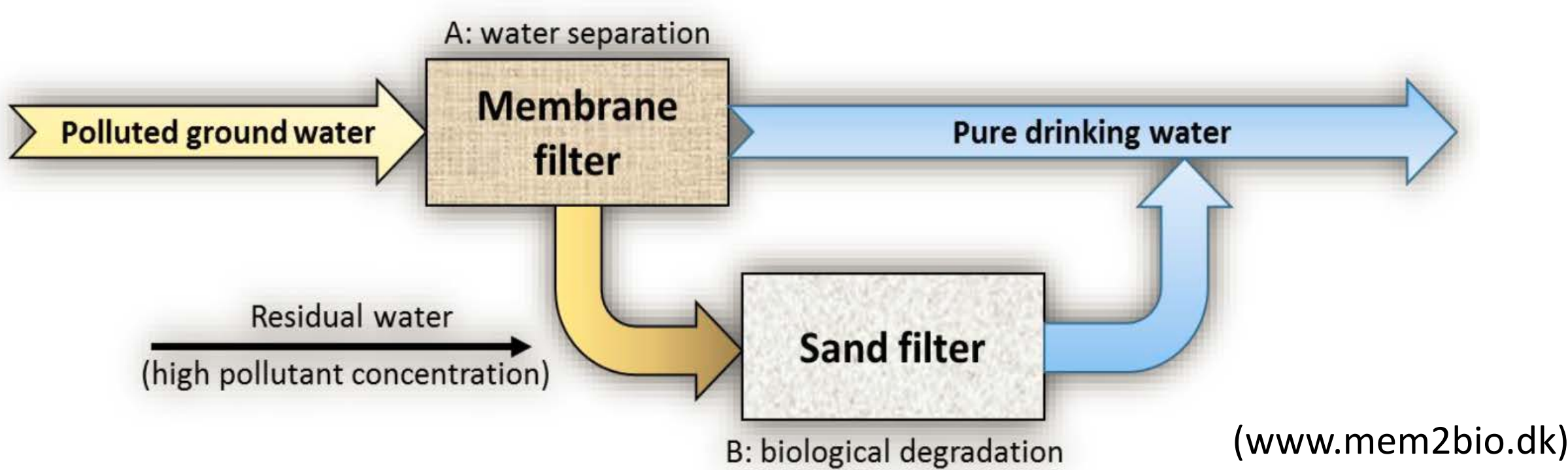
CONCLUSIONS

- MSH1 degradation potential is stimulated in the membrane retentates
- Stimulation of degradation potential in retentates is irrespective of BAM concentration
- MSH1 population remains stable

PERSPECTIVES

- Retentate from membrane separation could act as stimulating feed for bioaugmented sand filters in drinking water production – prolonging the stability of introduced degrader strain
- Giving way for a novel environmentally friendly biotechnology for eliminating micropollutants during water purification

BOX 1 – CONCEPT & HYPOTHESIS

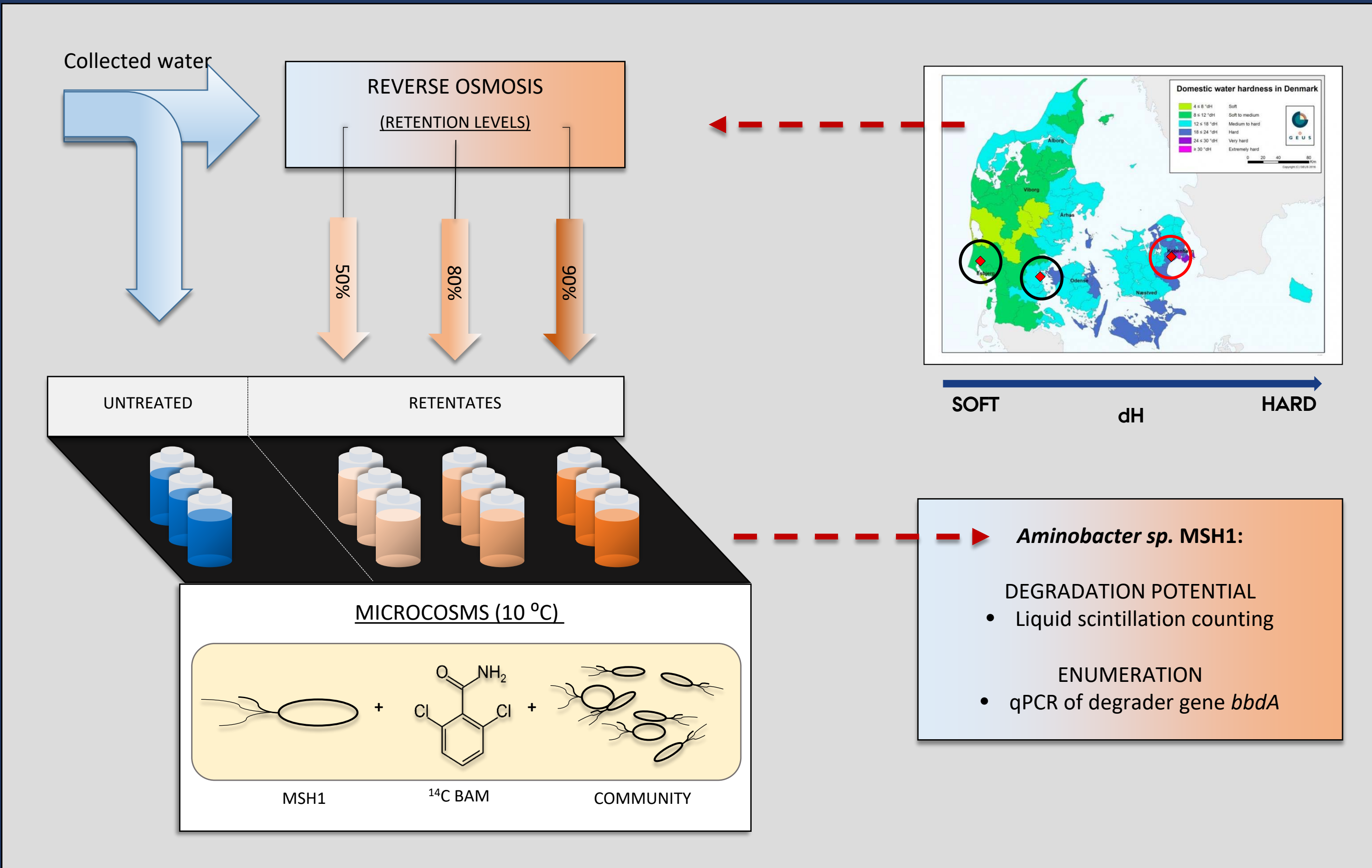


One of the main challenges in sand filter bioaugmentation is low pollutant concentrations as this can result in loss of degrader population and/or activity over time, due to starvation².

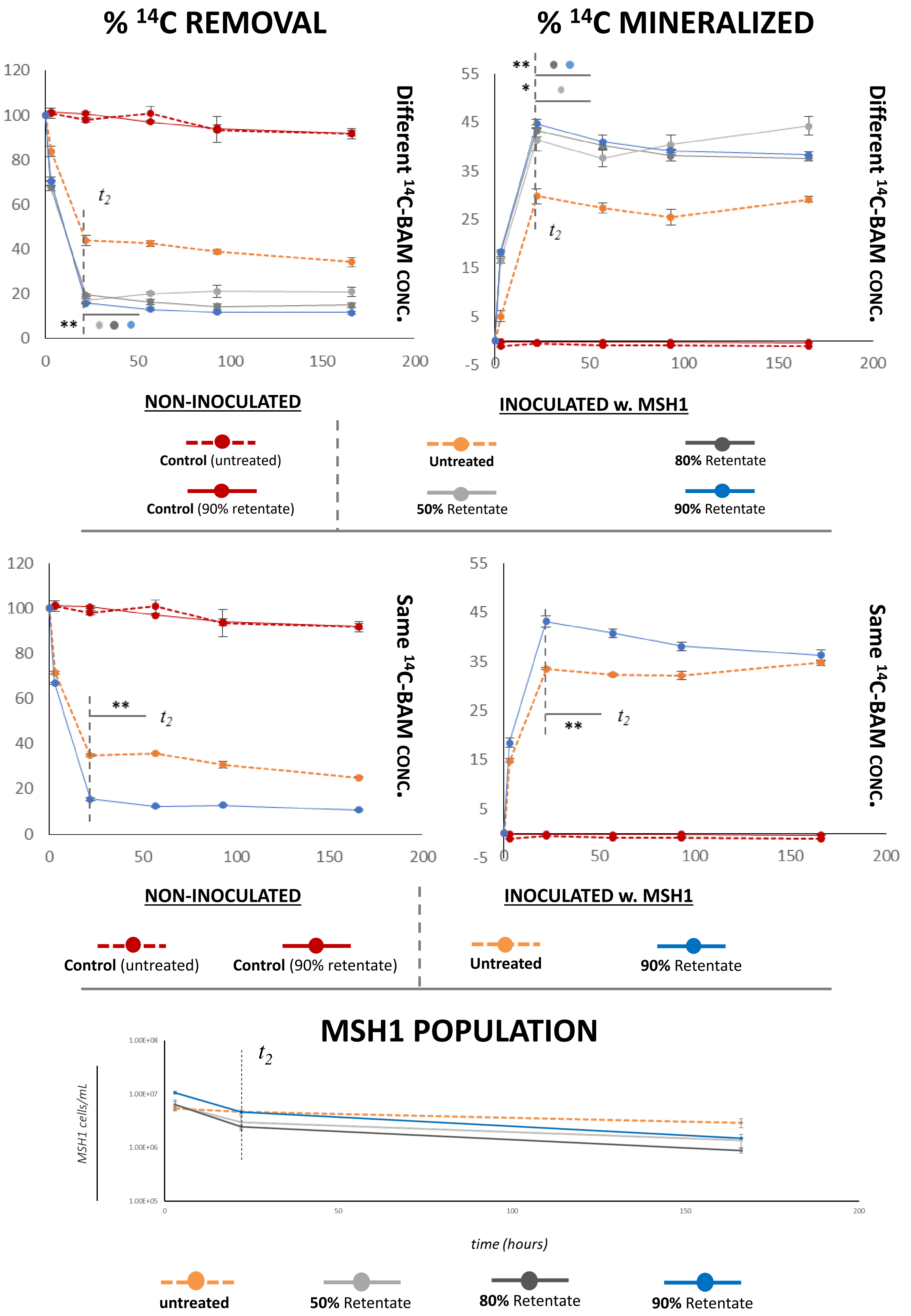
Membrane separation will increase concentration of target pollutant in retentate, which in turn could act as feed for a sand filter, dedicated to bioaugmentation.

Hypothesis: increased pollutant concentration should stimulate activity and enhance overall fitness of degrader bacteria.

BOX 2 - EXPERIMENTAL SETUP & WORKFLOW



BOX 3 - RESULTS



1. Ellegaard-Jensen, L., et al., Groundwater contamination with 2,6-dichlorobenzamide (BAM) and perspectives for its microbial removal. Appl Microbiol Biotechnol, 2017. 101(13): p. 5235-5245.
2. Albers, C.N., et al., Degradation of trace concentrations of the persistent groundwater pollutant 2,6-dichlorobenzamide (BAM) in bioaugmented rapid sand filters. Water Res, 2015. 83: p. 61-70.